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INSTALLATION RESTORATION PROGRAM PRELIMINARY  
ASSESSMENT: RECORDS SEARCH F. (U) HAZARDOUS MATERIALS  
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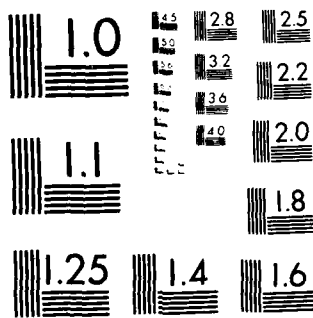
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## RECONSTRUCTION PROGRAM

Preliminary Assessment  
Records Search

119th Fighter Interceptor Group  
North Dakota Air National Guard  
Hector Field  
Fargo, North Dakota



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Reconstruction Program  
Records Search

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INSTALLATION RESTORATION PROGRAM  
PRELIMINARY ASSESSMENT - RECORDS SEARCH FOR

119th FIGHTER INTERCEPTOR GROUP  
NORTH DAKOTA AIR NATIONAL GUARD  
HECTOR FIELD  
FARGO, NORTH DAKOTA



October 1987

Prepared for  
National Guard Bureau  
Washington, D.C. 20310

Prepared by

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Contract No. DLA 900-82-C-4426

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## EXECUTIVE SUMMARY

### A. INTRODUCTION

The Hazardous Materials Technical Center (HMTc) was retained in April 1986 to conduct the Installation Restoration Program (IRP) Preliminary Assessment (PA) - Records Search of the 119th Fighter Interceptor Group (FIG), North Dakota Air National Guard, Hector Field, Fargo, North Dakota (hereinafter referred to as the Base) under Contract No. DLA 900-82-C-4426 (Records Search). The Records Search included:

- o an onsite visit including interviews with 13 Base personnel conducted by HMTc personnel on 28-30 April 1986;
- o the acquisition and analysis of pertinent information and records on hazardous materials use and hazardous waste generation and disposal at the Base;
- o the acquisition and analysis of available geologic, hydrologic, meteorologic, and environmental data from pertinent Federal, State, and local agencies; and
- o the identification of sites on the Base which may be potentially contaminated with hazardous materials/hazardous waste (HM/HW).

### B. MAJOR FINDINGS

The major operations of the 119th FIG that have used and disposed of HM/HW include aircraft maintenance; aerospace ground equipment (AGE) maintenance; ground vehicle maintenance; petroleum, oil, and lubricant (POL) management and distribution; and fire department training. The operations involve such activities as corrosion control, nondestructive inspection (NDI), fuel cell maintenance, engine maintenance, and pneudraulics. Waste oils, recovered fuels, and spent cleaners, strippers, and cleaning solvents were generated and disposed of by these activities.

Waste JP-4 and oils are sold to a private contractor for reutilization. Other hazardous waste materials generated by these operations have been disposed of by the Defense Reutilization and Marketing Office (DRMO) and by burning at the Fire Training Area (FTA).

Interviews with 13 Base personnel and a field survey resulted in the initial identification of 10 disposal and/or spill sites at the Base that are potentially contaminated with HM/HW:

- Site No. 1 - Grassy Area Adjacent to Pumphouse;
- Site No. 2 - Storage Area Adjacent to Building No. 231;
- Site No. 3 - Area Adjacent to Annex on Building No. 217A;
- Site No. 4 - Area Adjacent to AGE Building;
- Site No. 5 - Storage Area Between Building Nos. 206 and 214;
- Site No. 6 - Area Adjacent to Hangar;
- Site No. 7 - Area Adjacent to Motor Pool;
- Site Nos. 8 and 9 - Refueler Parking Aprons;
- Site No. 10 - Fire Training Area

Five of the identified potentially contaminated HM/HW sites (Site No. 2 - Storage Area Adjacent to Building No. 231, Site No. 3 - Area Adjacent to Annex on Building No. 217A, Site No. 7 - Area Adjacent to Motor Pool, and Site Nos. 8 and 9 - Refueler Parking Aprons) were not scored utilizing the U.S. Air Force Hazard Assessment Rating Methodology (HARM). However, based on experience of other Air Force Base IRP's, it is necessary to investigate these types of sites further to verify or refute the presence of HM/HW.

#### C. CONCLUSIONS

Five of the identified sites have been further evaluated and given a Hazard Assessment Score (HAS) utilizing HARM:

Site No. 1 - Grassy Area Adjacent to Pumphouse (HAS-48)

Approximately 300 to 500 gallons of JP-4 was spilled at this location and flowed over the paved area onto the surrounding grass.

Site No. 4 - Area Adjacent to AGE Building (HAS-45)

During periods of heavy precipitation waste oils had leaked out of stored 55-gallon drums. Discolored soil and dead vegetation was observed at the site.

Site No. 5 - Storage Area Between Building Nos. 206 and 214 (HAS-45)

Leakage from stored 55-gallon drums containing waste POL was noticed leaking during the site survey.

Site No. 6 - Area Adjacent to Hangar (HAS-55)

Periodic losses of jet fuel amounting to as much as 500 gallons/year occurred prior to 1981. A site survey revealed a visually defined area of discolored gravel.

Site No. 10 - Fire Training Area (HAS-55)

From the late 1950s to 1983, 300 to 500 gallons of JP-4 was used for fire training exercises, every 3 months. A strong POL odor was noticeable at the site.

Some sites present potential threats to nearby surface waters as a result of direct discharge of contaminated storm drainage. Likely receptors to any potential surface water contamination are persons using nearby streams for recreational purposes, such as fishing.

#### D. RECOMMENDATIONS

Because of the potential for contaminant migration, initial investigative stages of the IRP Site Investigation/Remedial Investigation/Feasibility Study (SI/RI/FS) are recommended for the five sites that are potentially contaminated with HM/HW. The primary purposes of the subsequent investigations are:

1. To determine whether pollutants at Site Nos. 1, 4, 5, 6, and 10 are or are not present, and
2. To determine whether surface or groundwater at the five sites has been contaminated, and if it has, to give quantification with respect to contaminant concentrations, the boundary of the contaminant plume, the rate of contaminant migration, and its direction.

## I. INTRODUCTION

### A. Background

The 119th Fighter Interceptor Group (FIG) is located at the North Dakota Air National Guard, Hector International Airport, Fargo, North Dakota (hereinafter referred to as the Base). The airport, a city-owned facility located at the northwest corner of Fargo, has been used by the North Dakota Air National Guard since its organization on January 16, 1947. Over the years, the types of military aircraft based and serviced there have varied due to the change in mission of the 119th FIG. Both past and present operations have involved the use and disposal of materials and wastes that subsequently have been categorized as hazardous. Consequently, the National Guard Bureau has implemented its Installation Restoration Program (IRP). The IRP consists of the following:

Preliminary Assessment (PA) - Records Search (Installation Assessment) - identifying past spill or disposal sites posing a potential and/or actual hazard to public health or the environment.

Site Investigation/Remedial Investigation/Feasibility Study (SI/RI/FS) - acquiring data via field studies for the confirmation and quantification of environmental contamination that may have an adverse impact on public health or the environment; preparing a Remedial Action Plan (RAP); and, if directed by the National Guard Bureau, preparing designs and specifications.

Research, Development and Demonstration (RD & D) - Technology Base Development (if needed) - developing new technology for accomplishment of remediation.

Remedial Design/Remedial Action (RD/RA) - Implementation of Site Remedial Action.

### B. Purpose

The purpose of this IRP PA - Records Search (hereinafter referred to as Re-

cords Search) is to identify and evaluate suspected problems associated with past hazardous waste handling procedures, disposal sites, and spill sites on the Base. The Hazardous Materials Technical Center (HMTc) visited the Base, reviewed existing environmental information, analyzed the Base records concerning the use and generation of HM/HW, conducted interviews with past and present personnel of the Base who are familiar with past HM/HW management activities, and made a physical inspection of the suspected sites. Relevant information collected and analyzed as a part of the Records Search included: the Base history, with special emphasis on the history of the shop operations and their past HM/HW management procedures; local geological, hydrological, and meteorological conditions that could influence migration of contaminants; local land use, public utilities, and zoning requirements that affect the potential for exposure to contaminants; and the ecological settings that indicate environmentally sensitive habitats or evidence of environmental stress.

#### C. Scope

The scope of this Records Search is limited to the Base and includes:

- o An onsite visit;
- o The acquisition of pertinent information and records on hazardous materials use and hazardous wastes generation and disposal practices at the Base;
- o The acquisition of available geologic, hydrologic, meteorologic, land use and zoning, critical habitat and utility data from various Federal, North Dakota State and local agencies;
- o A review and analysis of all information obtained; and
- o The preparation of a report, to include recommendations for further actions.

The onsite visit, interviews with past and present personnel, and meetings with Federal and State agency personnel were conducted during the period 28-30 April 1986. HMTc Records Search effort was conducted by Mr. Jeffrey D. Fletcher, Staff Scientist/Geologist and Mr. Timothy Gardner, Environmental Scientist. (Resumes are included in Appendix A).

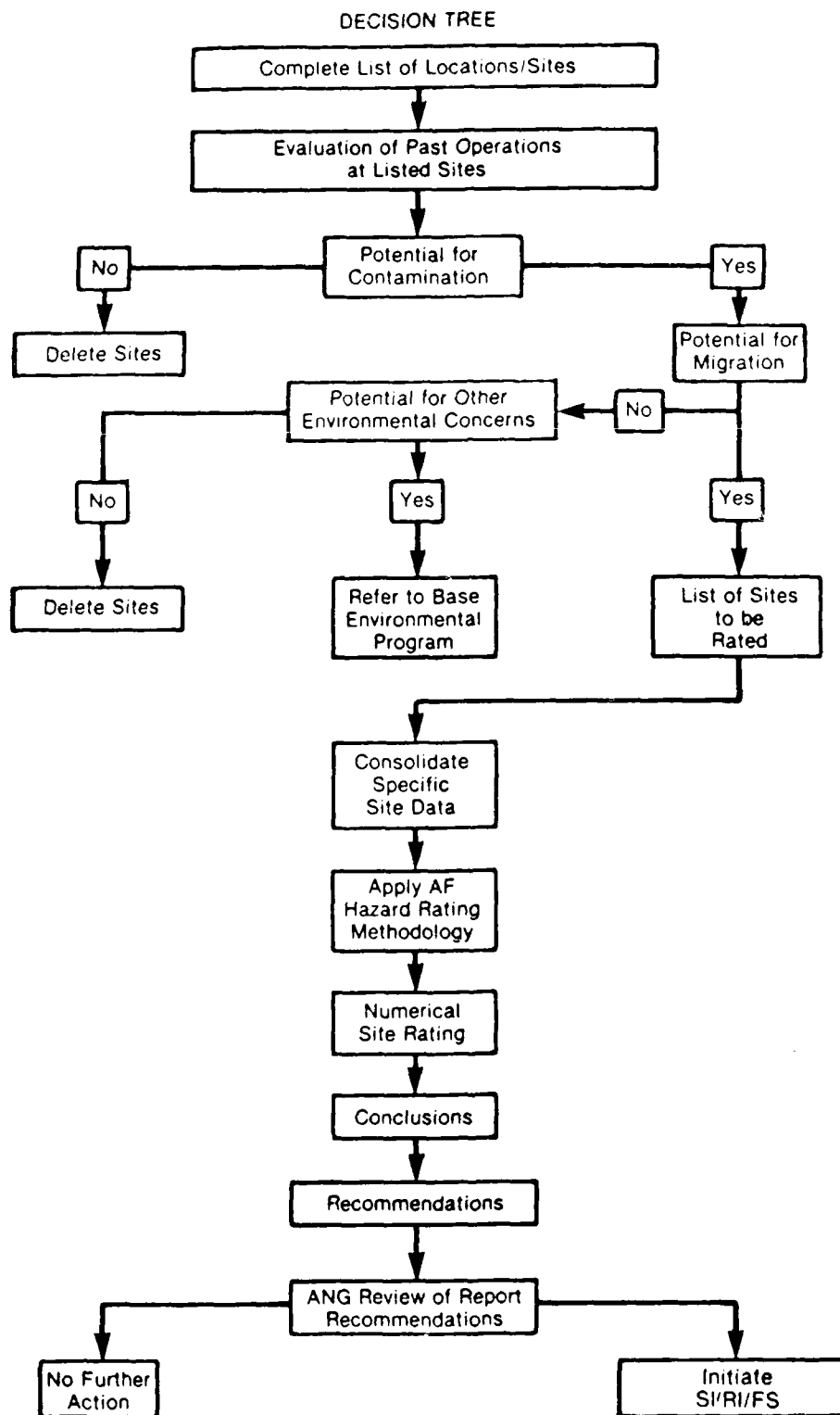
Individuals who assisted in the Records Search include Mr. Arthur Lee of the Air National Guard Support Center (ANGSC) and selected members of the 119th FIG. The Base Point of Contract (POC) was Capt. Richard E. Stelter, Assistant Base Civil Engineer.

#### D. Methodology

A flow chart of the Records Search Methodology is presented in Figure 1. This Records Search Methodology ensures a comprehensive collection and review of pertinent site specific information, and is utilized in the identification and assessment of potentially contaminated hazardous waste spill/disposal sites.

The Records Search began with a site visit to the Base to identify all shop operations or activities on the Base that may have utilized hazardous material or generated hazardous waste. Next, an evaluation of past and present HM/HW handling procedures at the identified locations was made to determine whether environmental contamination may have occurred. The evaluation of past HM/HW handling practices was facilitated by extensive interviews with 13 past and present employees familiar with the various operating procedures at the Base. These interviews also defined the areas on the Base where waste materials, either intentionally or inadvertently, may have been used, spilled, stored, disposed of, or released into the environment.

Appendix B lists the interviewee's principal areas of knowledge and their years of experience with the Base. Historic records contained in the Base's files were collected and reviewed to supplement the information obtained from interviews. Using the information outlined above, a list was compiled of past waste spill/disposal sites on the Base that required further evaluation. A general survey tour of the identified spill/disposal sites, the Base, and the surrounding area was conducted to determine the presence of visible contamination and to help assess the potential for contaminant migration. Particular attention was given to locating nearby drainage ditches, surface water bodies, residences, and wells.



Detailed geological, hydrological, meteorological, development (land use and zoning), and environmental data for the area of study was also obtained from the POC or from appropriate Federal, North Dakota State, and local agencies (Appendix C). Following a detailed analysis of all the information obtained, it was determined that five sites are potentially contaminated with HM/HW and the potential for contaminant migration exists. Where sufficient information was available, sites were numerically scored utilizing the Air Force Hazard Assessment Rating Methodology (HARM). Recommendations for follow-up investigations at the five potentially contaminated sites were developed.

## II. INSTALLATION DESCRIPTION

### A. Location

The 119th FIG is located at Hector Field, Fargo, in Cass County, North Dakota. The 119th occupies the southeast corner of the Hector International Airport. The Base, which is situated approximately 900 feet above sea level, is comprised of 133 acres designated for exclusive use by the ANG. The runways are used jointly with the airport. Figure 2 shows the location and the boundaries of the Base covered by this Records Search.

### B. History

Hector Field was first utilized by the North Dakota Air National Guard in 1947. On January 20 of that year, the 178th Fighter Interceptor Squadron, the flying arm of the 119th FIG, carried out its first flight training in an AT-6.

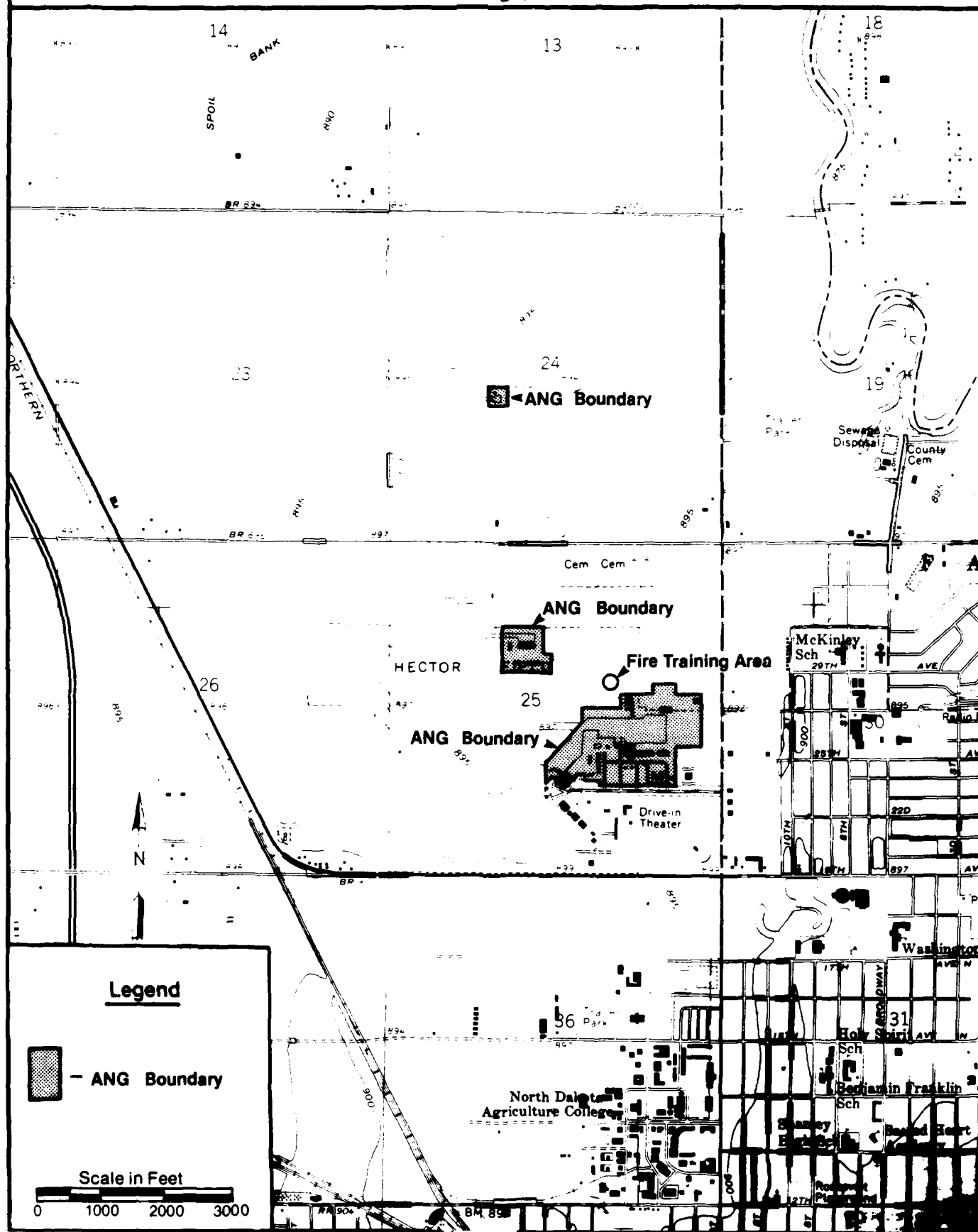
During the Korean War, the unit was deployed to various other installations and ultimately to Korea. Following its return to Fargo, the unit became involved in the jet fighter era. Various types of military aircraft have been associated with the 119th FIG. These aircrafts have included T-33s, F-89s, and C-131s. Currently, F-4Ds are assigned to the 119th.

HMTC

Adapted From:  
USGS 7-1/2 minute Quadrangle  
Fargo North, North Dakota  
(Rev. 1976)

Figure 2.

Location Map of North Dakota ANG, Hector Field,  
Fargo, North Dakota.



### III. ENVIRONMENTAL SETTING

#### A. Meteorology

Precipitation in Fargo, North Dakota, based on the period 1951-1978, averages 20.17 inches annually. By calculating net precipitation according to the method outlined in the Federal Register (47 FR 31224, July 16, 1982), a net precipitation value of negative 8.58 inches per year is obtained. Rainfall intensity based on 1-year, 24-hour rainfall is 1.93 inches (calculated according to 47 FR 31235, July 16, 1982, Figure 8).

#### B. Geology

Cass County, North Dakota, is located in the Central Lowland Province of the Great Plains. The eastern three-fourths of the county, including the Base, is located in the Red River Valley (the Lake Agassiz Basin) physiographic division. The geology of Cass County is typical of this region, consisting of level and nearly level, fine-textured soils that formed in glacial lacustrine sediment on glacial lake plains.

The Base is situated on one major soil association of the Red River Valley: the Fargo-Ryan Association. This association is level, deep and poorly drained soil on glacial lake plains. The two soil types that make up the Fargo-Ryan Association and have been identified within Base boundaries are 1) Fargo-Ryan silty clays, and 2) the Fargo silty clays. The only differences between the two soil types are that the Fargo soil has a slow permeability rate ( $4.2 \times 10^{-5}$  cm/sec to  $1.4 \times 10^{-4}$  cm/sec) as compared with the Fargo-Ryan soil which has a very slow permeability rate (less than  $4.2 \times 10^{-5}$  cm/sec). Also, there is a one percent hydraulic gradient difference between the two soil types.

## C. Hydrology

### 1. Surface Water

The Base is not within the boundaries of a floodplain associated with 100-year frequency floods. Local drainage is predominately to the east through drainage ditches, but is poorly defined within the area of the Base except during periods of heavy precipitation.

### 2. Groundwater

Area groundwater levels are fairly shallow. Average water table depths are from 6 to 8 feet, although seasonal fluctuations may occur.

The groundwater flow direction across the Base is generally from west to east. Because of the small hydraulic gradient (1 to 2 feet per mile) and the permeability rate of the soils, the average groundwater flow velocity is very slow. Average groundwater flow velocity; as calculated by Darcy's Law, which takes in consideration the porosity, hydraulic gradient, and the hydraulic conductivity; is approximately 0.5 meters per year.

The Base has no groundwater wells. The installation and the city of Fargo are both served by a municipal water supply system.

## D. Critical Habitats/Endangered or Threatened Species

Information gathered from the United States Department of Agriculture's Soil Survey of the Cass County Area, North Dakota, disclosed that there are no indigenous endangered or threatened species of flora or fauna in the vicinity of the Base, and no critical habitats, wetlands, or wilderness areas.

#### IV. SITE EVALUATION

##### A. Activity Review

A review of Base records and interviews with past and present personnel at the Base resulted in the identification of specific operations within each activity in which the majority of industrial chemicals are handled and hazardous wastes are generated. Table 1 summarizes the major operations associated with each activity, provides estimates of the quantities of waste currently being generated by these operations, and describes the past and present disposal practices for the wastes. Based on information gathered, any operation that is not listed in Table 1 has been determined to produce negligible (less than 5 gallons per year) quantities of waste requiring disposal.

##### B. Disposal/Spill Site Identification, Evaluation, and Hazard Assessment

Interviews with thirteen Base personnel (Appendix B) and subsequent site inspections resulted in the identification of ten waste disposal/spill sites. It was determined that five of the ten sites are potentially contaminated with HM/HW, with a potential for migration; therefore, they should be further evaluated. All five of these sites were rated using HARM (Appendix D). Figure 3 illustrates the locations of the scored/unscored sites. A copy of the completed Hazardous Assessment Rating Form is found in Appendix E. Table 2 summarizes the Hazard Assessment Score (HAS) of the scored sites.

###### Site No. 1 - Grassy Area Adjacent to Pumphouse (HAS-48)

Over the past 5 years, there has been an estimated loss of 300 to 500 gallons of JP-4 adjacent to the fuel facility. The fuel loss has been a series of minor spills that have produced puddles on the edge of the paved road. The site was visually defined by an area of dead grass along the paved area. No recovery was made, and the waste fluids were assumed to have been entirely lost to the environment. Confirmation of the spill and the presence of dead vegetation indicated that a HAS was required at this site.

Table 1. Hazardous Waste Disposal Summary: North Dakota ANG, Hector Field, Fargo, North Dakota

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY Gallons/Year	METHODS OF TREATMENT, STORAGE & DISPOSAL			
				1947	1960	1970	1986
Aircraft Maintenance	217, 223, 231, 370	Sulfuric Acid	30	—	NEUTR	—	—
		Xylene	16	—	CONTRACT	—	DRMO
		Trichloroethane	55	—	CONTRACT	—	DRMO
		Sodium Hydroxide	75	—	NEUTR	—	—
		Engine Oil	80	—	CONTRACT	—	DRMO
		Paint Stripper	200	—	SAN SEWER	—	DRMO
		PS-661 Solvent	300	—	CONTRACT	—	DRMO
		JP-4	300	—	CONTRACT	—	DRMO
		Nitrocellulose (thinner)	50	—	CONTRACT	—	DRMO
				—	—	—	—
Aerospace Ground Equipment Maintenance	370	PD-680	240	—	CONTRACT	—	DRMO
		Parts Cleaner	220	—	SAN SEWER	—	—
		Turbine Oil	165	—	CONTRACT	—	DRMO
		Hydraulic Oil	55	—	CONTRACT	—	DRMO
		Engine Oil	550	—	CONTRACT	—	DRMO
Vehicle Maintenance Motor Pool	207, 215	Ethylene Glycol	110	—	SAN SEWER	—	—
		Lube Oil	19	—	CONTRACT	—	DRMO
		Hydraulic Fluid	108	—	CONTRACT	—	DRMO
		Transmission Fluid	78	—	CONTRACT	—	DRMO
		Engine Oil	485	—	CONTRACT	—	DRMO
		JP-4	2,200	—	FT	—	—
				—	—	—	—
Fuels Management				—	CONTRACT	—	DRMO
		JP-4	2,500 2,000	—	FT	—	—

KEY:  
 CONTRACT - Disposed of by Contractor  
 FT - Disposed of during fire training  
 DRMO - Disposed of by Defense Reutilization and Marketing Office  
 NEUTR - Neutralized and drained to sanitary sewer  
 SAN SEWER - Drained to sanitary sewer

WMTD

Adapted From:  
Hector International Airport-ANG  
Fargo, North Dakota ANG  
Development Plan

Location of Sites at North Dakota ANG, Hector Field,  
Fargo, North Dakota.

Figure 3.

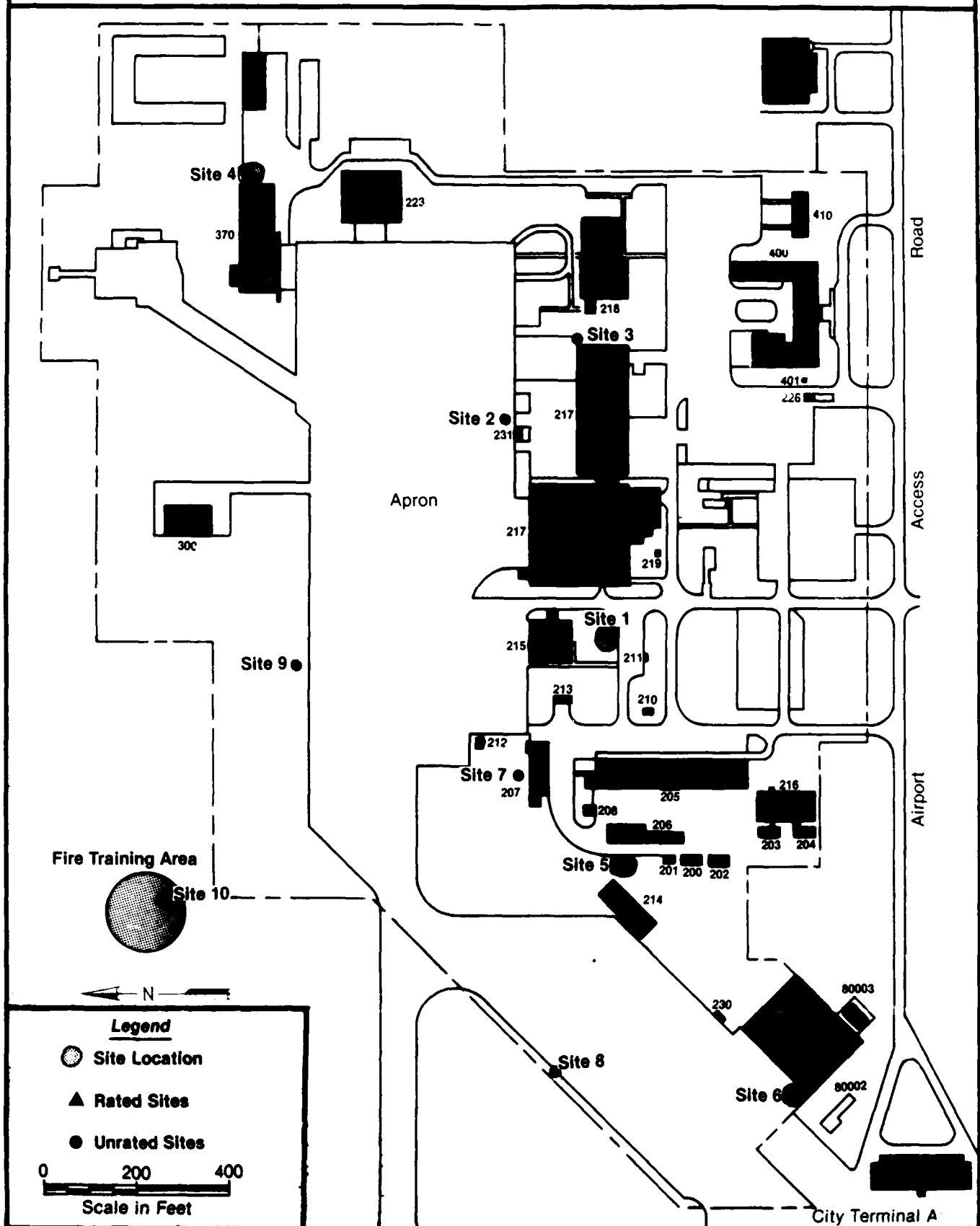


Table 2. Site Hazard Assessment Scores (as Derived from HARM): North Dakota ANG, Hector Field, Fargo, North Dakota

Site Priority	Site Number	Site Description	Receptor	Waste Character istics	Pathway	Waste Mgmt. Practices	Overall Score
1	10	Fire Training Area	41	80	44	1.0	55
2	6	Area Adjacent to Hangar	41	50	44	1.0	55
3	1	Grass Area Adjacent to Pumphouse Area	41	60	44	1.0	48
4	5	Storage Area Between Building Nos. 206 and 214	41	80	44	1.0	45
5	4	Area Adjacent to AGE Building	41	50	44	1.0	45

Site 2 - Storage Area Adjacent to Building No. 231 (Unrated)

Waste hydraulic oils were known to have leaked into the surrounding ground through a hole in a 300-gallon underground storage tank. Estimates of the quantity of spilled oil varied throughout the interviewing process, so no reliable estimate of the quantity exists. A site inspection produced no evidence of environmental stress. Because there are no known nearby receptors or environmental stress, a HAS was not required at this site.

Site 3 - Area Adjacent to Annex on Building No. 217A (Unrated)

The site is located adjacent to the annex on Building 217A. During interviews with Base personnel, it was learned that during a period of heavy precipitation, a small quantity of waste oils had floated out of an underground storage tank through a ground level opening used to fill the tank. The interviews suggested that the waste oil loss was not significant enough (less than 80 gallons) to require a HAS at this site.

Site 4 - Area Adjacent to AGE Building (HAS-45)

The site is located on the eastern side of the AGE building. It consists of a waste storage area which contains stored waste oils in 55-gallon drums. In 1983, ANG personnel revealed that during a period of heavy precipitation, waste oils had leaked out of a bung opening on one of the drums. It was suggested that the leakage had occurred periodically over the previous 10 years with an estimated loss of less than 70 gallons of waste oils. Visual inspection of the site revealed discolored grass surrounding the drums. Because of the noticeable discoloration of the grass and the uncertain extent of past contamination, a HAS was required at this site.

Site 5 - Storage Area Between Building Nos. 206 and 214 (HAS-45)

This waste storage area is located on the eastern side of the north-south fence between Building 206 and 214. During the site inspection, small areas of

leakage from 55-gallon drums containing waste POL products were noticed. A total of approximately 75 gallons had leaked from the drums. The surrounding area was discolored, and dead grass and a noticeable odor was present. Confirmation of vegetative stress, visual discharges, and the uncertain extent of contamination indicated that a HAS was warranted and further IRP study should be performed at this site.

#### Site 6 - Area Adjacent to Hangar (HAS-55)

The site is located outside the southwestern corner of guard property, adjacent to the aircraft hangar. Interviews with ANG personnel suggested that up until approximately 5 years ago there had been periodic losses of an estimated 500 gallons/year of jet fuel at the Northwest Orient fuel facility. According to Base personnel, at times the adjacent North Dakota ANG hangar ramp was noticeably softer due to the spills. A site survey revealed a visually defined area of discolored gravel surrounding the fuel pumps. Surface migration of oil and grease onto guard property was visibly evident. Due to observed contamination of the soil and the lack of subsequent recovery, a HAS was warranted and further IRP analysis should be performed.

#### Site 7 - Area Adjacent to Motor Pool (Unrated)

Site 7 is located outside the motor pool Building 207. Interviews with Base personnel suggested that during periods of heavy precipitation there may have been some seepage of waste oil at the motor pool sumps. An onsite survey revealed no conclusive evidence of any spills. Lack of vegetative stress or noticeable odors suggested that a HAS was not necessary at this site.

#### Sites 8 and 9 - Refueler Parking Aprons (Unrated)

Sites 8 and 9 are mentioned together because JP-4 was lost at each site along the parking and refueling aprons. These two sites are located along the northern edge of the parking and refueling aprons. The site inspection revealed no evidence of any vegetative stress and the absence of nearby receptors indicated that a HAS was not necessary for either site.

Site 10 - Fire Training Area (FTA) (HAS-55)

This site is just south of the east end of runway 21 and is located on property owned by the city of Fargo, N.D.; however, it is being considered in the Records Search because the Base has been the sole user of this site, and as such, holds ultimate responsibility for any hazardous waste found there. The site consists of an open area with no confinement structure. The area is used for the dumping and ignition of flammable liquids for training purposes. The area has been operational since the late 1950s. From the late 1950s to 1983, training occurred about once every 3 months. After 1983, the training exercises occurred twice quarterly. Throughout the history of the exercises, each episode involved from 300 to 500 gallons of JP-4. Any solvent use has been minimal.

Occasional high water table levels of 0 to 3 feet indicate that POL products could flow into a nearby drainage ditch. Because the soils are so dark in color, soil discoloration was not discernible, although an odor of POL products was quite noticeable. The large quantity of wastes disposed of at this site made it obvious that a HAS was needed.

As mentioned above, the drainage ditch (located due east of the FTA) is susceptible to surface contaminant migration during periods of heavy precipitation, because of surface runoff. Because of this, the ditch is considered a part of the site.

C. Other Pertinent Facts

- o There are no water wells on the Base. Water is supplied by the city of Fargo, which derives its water from the Red River.
- o Sanitary sewage is municipally treated.
- o There are no active or past landfills on the Base.
- o No radioactive wastes have been disposed of on the Base.

## V. CONCLUSIONS

- o Information obtained through interviews with 13 Base personnel, review of installation records, and field observations have resulted in the identification of 10 disposal and/or spill sites on the Base which existed prior to April 1986. Five of the 10 sites are potentially contaminated with HM/HW.
- o The five sites, Site Nos. 1, 4, 5, 6 and 10 have been rated using the Air Force HARM.
- o Field observations revealed no evidence of offsite environmental stress from past waste material disposal in the immediate vicinity of the Base.
- o Information obtained through interviews and review of Base records revealed that groundwater utilization at the Base is absent because of the availability of municipal supplies.
- o The overall groundwater environment of the Base is relatively unsusceptible to subsurface contaminant migration due to the slow permeability rates and a small hydraulic gradient. However, heavy periods of precipitation may lead to surface contaminant migration into adjacent drainage ditches (i.e., Site No. 10, Fire Training Area).

## VI. RECOMMENDATIONS

The following recommendations are made to ascertain if groundwater at the five identified sites have been contaminated, and to confirm or refute that Base generated contaminants are migrating off the Base.

### Site No. 1 - Grassy Area Adjacent to Pumphouse Area

Soil contamination at this site has been confirmed. Subsequent IRP analysis should be undertaken to determine the extent of soil contamination and to determine if groundwater has been contaminated.

### Site No. 4 - Area Adjacent to AGE Building

Further IRP analysis at this site is required to determine if contamination exists.

### Site No. 5 - Waste Storage Area Between Building Nos. 206 and 214

Further IRP analysis at this site is required to determine if contamination exists.

### Site No. 6 - Area Adjacent to Hangar

Further IRP analysis at this site is required to determine if contamination exists.

### Site No. 10 - Fire Training Area

Soil contamination at this site has been confirmed. Subsequent IRP analysis should be performed to determine the extent of soil contamination and to determine if groundwater contamination exists.

## GLOSSARY OF TERMS

AQUIFER - A geologic formation, or group of formations, that contains sufficient saturated permeable material to conduct groundwater and to yield economically significant quantities of groundwater to wells and springs.

CONTAMINANT - As defined by Section 101(f)(33) of SARA shall include, but not be limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

- (a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,
- (b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,
- (c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),
- (d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,
- (e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and
- (f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act;

and shall not include natural gas, liquified natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

CRITICAL HABITAT - The native environment of an animal or plant which, due either to the uniqueness of the organism or the sensitivity of the environment, is susceptible to adverse reactions to environmental changes such as may be induced by chemical contaminants.

DOWNGRADIANT - A direction that is hydraulically downslope, i.e., the direction in which groundwater flows.

ENDANGERED SPECIES - Wildlife species that are designated as endangered by the U.S. Fish and Wildlife Service.

GROUNDWATER - Refers to the subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated.

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, 11 December 1981).

HAS - Hazard Assessment Score - The score developed by utilizing the Hazardous Assessment Rating Methodology (HARM).

HAZARDOUS MATERIAL - Any substance or mixture of substances having properties capable of producing adverse effects on the health and safety of the human being. Specific regulatory definitions also found in OSHA and DOT rules.

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

- a. Cause, or significantly contribute to, an increase in mortality or an increase in serious or incapacitating reversible illness; or
- b. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of, or otherwise managed.

MIGRATION (Contaminant) - The movement of contaminants through pathways (groundwater, surface water, soil and air).

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure.

SOIL PERMEABILITY - The characteristic of the soil that enables water to move downward through the profile. Permeability is measured as to the number of inches per hour that water moves downward through the saturated soil.

Terms describing permeability are:

Very Slow	- less than 0.06 inches per hour (less than $4.2 \times 10^{-5}$ cm/sec)
Slow	- 0.06 to 0.20 inches per hour ( $4.23 \times 10^{-5}$ to $1.4 \times 10^{-4}$ cm/sec)
Moderately Slow	- 0.2 to 0.6 inches per hour ( $1.4 \times 10^{-4}$ cm/sec)
Moderate	- 0.6 to 2.0 inches per hour ( $4.2 \times 10^{-4}$ to $10^{-3}$ cm/sec)
Moderately Rapid	- 2.0 to 6.0 inches per hour ( $1.4 \times 10^{-3}$ to $4.2 \times 10^{-3}$ cm/sec)
Rapid	- 6.0 to 20 inches per hour ( $4.2 \times 10^{-3}$ to $1.4 \times 10^{-2}$ cm/sec)
Very Rapid	- more than 20 inches per hour (more than $1.4 \times 10^{-2}$ cm/sec)

(Reference: U.S.D.A. Soil Survey)

SURFACE WATER - All water exposed at the ground surfaces including streams, rivers, ponds, and lakes.

THREATENED SPECIES - Wildlife species that are designated as threatened by the U.S. Fish and Wildlife Service.

TOPOGRAPHY - The general conformation of a land surface, including its relief and the position of its natural and manmade features.

UPGRADIENT - A direction that is hydraulically upslope.

WATER TABLE - The upper limit of the portion of the ground wholly saturated with water.

WETLANDS - An area subject to permanent or prolonged inundation or saturation that exhibits plant communities adapted to this environment.

WILDERNESS AREA - An area unaffected by anthropogenic activities and deemed worthy of special attention to maintain its natural condition.

## BIBLIOGRAPHY

1. Federal Emergency Management Agency, Firm Flood Insurance Rate Map of City of Fargo, North Dakota, January 19, 1982.
2. Lunde, N.J., Opdahl, D.P., Prochrow, N.D., and Terry, W.J., Soil Survey of Cass County Area, North Dakota, United States Department of Agriculture, 1983.
3. United States Department of the Interior Geological Survey, Fargo North Quadrangle, North Dakota-Minnesota, 7.5 Minute Series (Revised 1976).
4. United States Environmental Protection Agency, Federal Register, Vol. 47, July 18, 1982, Government Printing Office, Washington, D.C.

**Appendix A**  
**Resumes of Preliminary Assessment**  
**Team Members**

TIMOTHY N. GARDNER

Environmental Scientist

EDUCATION

M.A., Environmental Biology, Hood College  
B.S., Forestry/Resource Management, West Virginia University

EXPERIENCE

Mr. Gardner has five years of technical experience in environmental control and research, with emphasis on risk assessment, chemical safety, radiation safety, hazardous waste management (chemical and radiologic), and activated carbon filtration research. His past responsibilities include site risk assessment, chemical and radioactive waste pickup and storage for disposal at a large cancer research facility, and chemical and radioactive spill control, as well as safety surveys and technical assistance in activated carbon desorption research.

EMPLOYMENT

Dynamac Corporation (1984-Present): Staff Scientist

At Dynamac, Mr. Gardner's responsibilities include site surveys and records searches for the Phase I portion of the Installation Restoration Program (IRP) for various Air National Guard Bases. Efforts include risk assessment, site prioritization, and remedial action recommendations. He has also been a contributing author for a closure-post closure plan for a hazardous waste landfill at Clovis AFB, plans and specifications for the removal of asbestos at several Air Force White Alice sites in Alaska, and the update and revision of a DLA regulation for "Disposal of Unwanted Radioactive Material."

NCI-Frederick Cancer Research Facility (1981-1984): Lab Technician

Mr. Gardner worked in radiation and chemical safety as well as environmental research. His responsibilities included monitoring personal and environmental air quality at work areas where free iodinations occurred, monitoring work areas and equipment for isotope contamination, periodic surveys to monitor compliance with NRC safety regulations, isotope inventory control, transfer of isotopes between licenses, and periodic calibration and maintenance of survey instruments. He was also responsible for radioactive and chemical waste pickup and storage for disposal, and served as an advisor for safety-related matters pertinent to radiation and radioactive waste, chemical safety, and industrial hygiene. In the environmental research division, he was involved in activated carbon desorption studies involving the use of analytic laboratory equipment.

PROFESSIONAL AFFILIATIONS

American Tree Farm Association  
Hardwood Research Council  
West Virginia Forestry Association

JEFFREY D. FLETCHER

EDUCATION

B.S., geology, Millersville University, 1984

EXPERIENCE

Technical and field experience includes geologic mapping, water well site location, and construction of water table maps. Also performed site surveys and prepared records searches for Phase I of the Installation Restoration Program, and performed hazardous waste site assessments for the Federal Bureau of Prisons.

EMPLOYMENT

Dynamac Corporation, HMTC (1986-present): Junior Staff Scientist/Geologist

Responsibilities include site surveys and preparation of records searches for Phase I of the Installation Restoration Program for the Air National Guard, and hazardous waste site assessments for the Federal Bureau of Prisons Hazardous Waste Site Investigation Program. Efforts include assessment of hazardous waste disposal sites for the purpose of determining rates and extents of contaminant migration and for identifying remedial actions.

Fletcher-Lowright and Assoc., Consulting Geologists (1984-1985):  
Geohydrology Aide

Primary duties included site location of water wells, analysis of well yield data through the use of computers, and construction of water table maps.

## **Appendix B**

### **Interviewee Information**

# INTERVIEWEE INFORMATION

Interviewee Number	Primary Duty Assignment	Years Associated with Hector Field ANGB
1	Civil Engineering	12
2	Civil Engineering	2
3	Aircraft Maintenance	30
4	Aircraft Maintenance	30
5	Aircraft Maintenance	30
6	Aircraft Maintenance	12
7	Fire Department	7
8	Facilities Maintenance	30
9	EOD Operations	5
10	EOD Operations	6
11	Fuels Management	8
12	Motor Pool	35
13	Material Facilities	10

**Appendix C**  
**Outside Agency Contact List**

OUTSIDE AGENCY CONTACT LIST

1. Federal Emergency Management Agency  
Federal Insurance Administration  
Flood Map Distribution Center  
6930 A-F San Thomas Road  
Baltimore, Maryland 21227
2. North Dakota Department of Agriculture  
Soil Conservation Service  
P.O. Box 1458  
Bismarck, North Dakota 58501
3. United States Geological Survey  
12207 Sunrise Valley Drive  
Reston, Virginia 22092

**Appendix D**  
**USAF Hazard Assessment**  
**Rating Methodology**

## USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DoD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DoD facilities. One of the actions required under this program is to:

"develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare and environmental impacts."  
(Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

### PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites suspected of contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-on site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating in either basis.

### DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD program needs.

The model uses data readily obtained during the Records Search portion (Preliminary Assessment) of the IRP. Scoring judgment and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1 of this report). The site rating form and the rating factor guideline are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: possible receptors of the contamination, the waste and its characteristics, the potential pathways for contamination migration, and any efforts that were made to contain the wastes resulting from a spill.

The receptors category rating is based on four rating factors: the potential for human exposure to the site, the potential for human ingestion of contaminants should underlying aquifers be polluted, the current and anticipated uses of the surrounding area, and the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1,000 feet of the site, and the distance between the site and the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed.

The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 x factor score subtotal/maximum score subtotal).

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of the three pathways: surface water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no containment are not reduced. Scores for sites with limited contaminant can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

## HAZARDOUS ASSESSMENT RATING FORM

Page 1 of 2

NAME OF SITE \_\_\_\_\_

LOCATION \_\_\_\_\_

DATE OF OPERATION OR OCCURRENCE \_\_\_\_\_

OWNER/OPERATOR \_\_\_\_\_

COMMENTS/DESCRIPTION \_\_\_\_\_

SITE RATED BY \_\_\_\_\_

## I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to installation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 1 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		

Subtotals \_\_\_\_\_

Receptors subscore (100 X factor score subtotal/maximum score subtotal) \_\_\_\_\_

## II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) \_\_\_\_\_
2. Confidence level (C = confirmed, S = suspected) \_\_\_\_\_
3. Hazard rating (H = high, M = medium, L = low) \_\_\_\_\_

Factor Subscore A (from 20 to 100 based on factor score matrix) \_\_\_\_\_

- B. Apply persistence factor  
Factor Subscore A X Persistence Factor = Subscore B

\_\_\_\_\_ X \_\_\_\_\_ = \_\_\_\_\_

- C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

\_\_\_\_\_ X \_\_\_\_\_ = \_\_\_\_\_

**III. PATHWAYS**

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 30 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
				Subscore _____
B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface water migration				
Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
			Subtotals	_____
			Subscore (100 X factor score subtotal/maximum score subtotal)	
			_____	_____
2. Flooding				
		1		
			Subscore (100 X factor score/3)	
			_____	_____
3. Ground water migration				
Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
			Subtotals	_____
			Subscore (100 X factor score subtotal/maximum score subtotal)	
			_____	_____
C. Highest pathway subscore.				
Enter the highest subscore value from A, B-1, B-2 or B-3 above.				
			Pathways Subscore	_____

**IV. WASTE MANAGEMENT PRACTICES**

- A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	_____
Waste Characteristics	_____
Pathways	_____

Total \_\_\_\_\_ divided by 3 = \_\_\_\_\_

Gross Total Score

- B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

\_\_\_\_\_ X \_\_\_\_\_ =

# HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

## 1. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels			Multiplier
	0	1	2	3
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet
C. Land Use/Zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	Residential
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands
F. Water quality/use designation of nearest surface water body	Agricultural or Industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, Industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available
H. Population served by surface water supplies within 3 miles downstream of site	0	1-15	51-1,000	Greater than 1,000
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000

## II. WASTE CHARACTERISTICS

### A-1 Hazardous Waste Quantity

- S = Small quantity (5 tons or 20 drums of liquid)  
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)  
L = Large quantity (20 tons or 85 drums of liquid)

### A-2 Confidence Level of Information

- C = Confirmed confidence level (minimum criteria below)

o Verbal reports from interviewer (at least 2) or written information from the records

o Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

o No verbal reports or conflicting verbal reports and no written information from the records

o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

### A-3 Hazard Rating

Rating Factors	Rating Scale Levels			
	0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

### Hazard Rating Points

High (H)	3
Medium (M)	2
Low (L)	1

# 11. WASTE CHARACTERISTICS--Continued

## Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	I	C	II
80	I	C	M
70	M	C	II
60	I	S	II
60	S	C	II
60	M	C	M
50	I	S	M
50	I	C	I
50	M	S	II
50	S	C	M
40	S	S	II
40	M	S	M
40	M	C	I
40	I	S	I
30	S	C	I
30	M	S	I
30	S	S	M
20	S	S	I

### Notes:

For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

- o Confidence Level
- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels.

### Waste Hazard Rating

- o Wastes with the same hazard rating can be added.
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

## B. Persistence Multiplier for Point Rating

Multiply Point Rating Persistence Criteria	From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

## C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

### 111. PATHWAYS CATEGORY

#### A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

#### B-1 Potential for Surface Water Contamination

Rating Factors	Rating Scale Levels			Multiplier
	0	1	2	
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet 8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches 6
Surface erosion	None	Slight	Moderate	Severe 8
Surface permeability	0% to 15% clay (>10 <sup>-2</sup> cm/sec)	15% to 30% clay (10 <sup>-3</sup> to 10 <sup>-4</sup> cm/sec)	30% to 50% clay (10 <sup>-4</sup> to 10 <sup>-6</sup> cm/sec)	Greater than 50% clay (>10 <sup>-6</sup> cm/sec) 6
Rainfall intensity based on 1-year 24-hour rainfall (Thunderstorms)	<1.0 inch 0-5 0	1.0 to 2.0 inches 6-35 30	2.1 to 3.0 inches 36-49 60	>3.0 inches >50 100 8

#### B-2 Potential for Flooding

Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1
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#### B-3 Potential for Ground-Water Contamination

Depth to ground water	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Soil permeability	Greater than 50% clay (>10 <sup>-6</sup> cm/sec)	30% to 50% clay (10 <sup>-4</sup> to 10 <sup>-6</sup> cm/sec)	15% to 30% clay (10 <sup>-2</sup> to 10 <sup>-4</sup> cm/sec)	0% to 15% clay (<10 <sup>-2</sup> cm/sec)	8

### B-3 Potential for Ground-Water Contamination--Continued

Rating Factors	Rating Scale Levels			Multiplier
	0	1	2	
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	8
Direct access to ground water (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	8
			High risk	

#### IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

#### B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

#### Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

#### Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

#### Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

#### Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-6-3, then leave blank for calculation of factor score and maximum possible score.

CNR172

**Appendix E**  
**Site Hazardous Assessment**  
**Rating Forms**

119th Fighter Interceptor Group  
North Dakota Air National Guard  
Hector Field  
Fargo, North Dakota

USAF Hazard Assessment Rating Methodology  
Factor Rating Criteria

1. RECEPTORS

Population within 1,000 feet of site:	Approximately 75
Distance to nearest well:	Approximately 3 miles
Land use/zoning within 1 mile radius:	Commercial/Industrial
Distance to installation boundary:	
Site No. 1	Less than 300 feet
Site No. 4	Less than 100 feet
Site No. 5	Less than 300 feet
Site No. 6	Less than 100 feet
Site No. 10	Less than 500 feet
Critical environments within 1 mile:	Not a critical environment
Water Quality of nearest surface water body:	Potable water supply
Groundwater use of uppermost aquifer:	Not used; other sources available
Population served by surface water supply within 3 miles downstream of site:	Greater than 1,000
Population served by groundwater supply within 3 miles of site:	0

2. WASTE CHARACTERISTICS

Quantity

Site No. 1	Approximately 500 gallons
Site No. 4	More than 70 gallons
Site No. 5	Approximately 75 gallons
Site No. 6	More than 4,000 gallons
Site No. 10	More than 17,000 gallons

119th Fighter Interceptor Group  
North Dakota Air National Guard  
Hector Field  
Fargo, North Dakota

USAF Hazard Assessment Rating Methodology  
Factor Rating Criteria (Continued)

2. WASTE CHARACTERISTICS (Continued)

Confidence Level

Site No. 1	Confirmed
Site No. 4	Confirmed
Site No. 5	Confirmed
Site No. 6	Confirmed
Site No. 10	Confirmed

Hazard Rating

Site No. 1	Medium
Site No. 4	Medium
Site No. 5	Medium
Site No. 6	Medium
Site No. 10	Medium

3. PATHWAYS

Surface Water Migration

Distance to nearest surface water:	About 500 feet
Net precipitation:	-8.58 inches
Surface erosion	None
Surface permeability:	$>10^{-6}$ cm/sec
Rainfall intensity:	1.93 inches

Flooding:	Beyond 100-year floodplain
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119th Fighter Interceptor Group  
North Dakota Air National Guard  
Hector Field  
Fargo, North Dakota

USAF Hazard Assessment Rating Methodology  
Factor Rating Criteria (Continued)

3. PATHWAYS (Continued)

Groundwater Migration

Depth to groundwater:	0 to 10 feet
Net precipitation:	-8.58 inches
Soil permeability:	$>10^{-6}$ cm/sec
Subsurface flow:	Occasionally submerged
Direct access to groundwater:	No evidence of risk

## HAZARDOUS ASSESSMENT RATING FORM

Page 1 of 1

NAME OF SITE Site No. 1 Grassy Area Adjacent to Pump House

LOCATION North Dakota Air National Guard, Hector Field, Fargo, ND

DATE OF OPERATION OR OCCURRENCE January 1984

OWNER/OPERATOR 119th Civil Engineer Squadron, North Dakota Air National Guard

COMMENTS/DESCRIPTION Grass Area along Paved Area

SITE RATED BY HMTG

## 1. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	0	10	0	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	3	6	18	18
G. Ground water use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	3	6	18	18
I. Population served by ground-water supply within 3 miles of site	0	6	0	18
Subtotals			74	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal)

40

## 11. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large)
2. Confidence level (C - confirmed, S - suspected)
3. Hazard rating (H - high, M - medium, L - low)

MCM60

Factor Subscore A (from 20 to 100 based on factor score matrix)

- B. Apply persistence factor

Factor Subscore A X Persistence Factor = Subscore B

60x 1.0= 60

- C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

60x 1.0= 60

**III. PATHWAYS**

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 30 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
				Subscore _____
B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	3	6	18	18
Rainfall intensity	1	8	8	24
Subtotals			48	108
Subscore (100 X factor score subtotal/maximum score subtotal)				44
2. Flooding				
	0	1	0	3
Subscore (100 X factor score/3)				0
3. Ground water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	0	8	0	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
Subtotals			58	114
Subscore (100 X factor score subtotal/maximum score subtotal)				33
C. Highest pathway subscore.				
Enter the highest subscore value from A, B-1, B-2 or B-3 above.				
Pathways Subscore				44

**IV. WASTE MANAGEMENT PRACTICES**

- A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	40
Waste Characteristics	60
Pathways	44
Total 144 divided by 3 =	48
Gross Total Score	

- B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

$$48 \times 1.0 = 48$$

## HAZARDOUS ASSESSMENT RATING FORM

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NAME OF SITE Site No. 4 - Area Adjacent to AGE Building

LOCATION North Dakota Air National Guard, Hector Field, Fargo, ND

DATE OF OPERATION OR OCCURRENCE Approximately 1973 - 1983

OWNER/OPERATOR 119th Civil Engineer Squadron, North Dakota Air National Guard

COMMENTS/DESCRIPTION Temporary Storage Area

SITE RATED BY HMTC

## 1. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	0	10	0	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	3	6	18	18
G. Ground water use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	3	6	18	18
I. Population served by ground-water supply within 3 miles of site	0	6	0	18

Subtotals 74 180Receptors subscore (100 X factor score subtotal/maximum score subtotal) 41

## 11. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S2. Confidence level (C = confirmed, S = suspected) C3. Hazard rating (H = high, M = medium, L = low) MFactor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor

Factor Subscore A X Persistence Factor = Subscore B

50 X 1.0 = 50

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

50 X 1.0 = 50

**III. PATHWAYS**

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 30 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
Subscore				0
B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	23
Surface permeability	3	6	18	18
Rainfall intensity	1	8	8	24
Subtotals			48	108
Subscore (100 X factor score subtotal/maximum score subtotal)				44
2. Flooding	0	1	0	5
Subscore (100 X factor score/3)				0
3. Ground water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	0	8	0	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
Subtotals			38	114
Subscore (100 X factor score subtotal/maximum score subtotal)				35
C. Highest pathway subscore.				
Enter the highest subscore value from A, B-1, B-2 or B-3 above.				
Pathways Subscore				44

**IV. WASTE MANAGEMENT PRACTICES**

- A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	41
Waste Characteristics	50
Pathways	44

Total 135 divided by 3 = 45

Gross Total Score

- B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

$$45 \times 1.0 = 45$$

## HAZARDOUS ASSESSMENT RATING FORM

Page 1 of 1

NAME OF SITE Site No. 5 - Storage Area Between Building Nos. 206 and 214LOCATION North Dakota Air National Guard, Hector Field, Fargo, NDDATE OF OPERATION OR OCCURRENCE Approximately 1981-1986OWNER/OPERATOR 119th Civil Engineer Squadron, North Dakota Air National GuardCOMMENTS/DESCRIPTION Temporary Storage AreaSITE RATED BY HMTC

## I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	0	10	0	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	3	6	18	18
G. Ground water use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 1 miles downstream of site	3	6	18	18
I. Population served by ground-water supply within 1 miles of site	0	6	0	18
Subtotals			74	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal)

41

## II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large)

S

2. Confidence level (C - confirmed, S - suspected)

C

3. Hazard rating (H - high, M - medium, L - low)

M

Factor Subscore A (from 20 to 100 based on factor score matrix)

50

B. Apply persistence factor

Factor Subscore A X Persistence Factor = Subscore B

$$\underline{50} \times \underline{1.0} = \underline{50}$$

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

$$\underline{50} \times \underline{1.0} = \underline{50}$$

**III. PATHWAYS**

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 30 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
Subscore				<u>0</u>
B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	3	6	18	18
Rainfall intensity	1	8	8	24
Subtotals			<u>48</u>	<u>108</u>
Subscore (100 X factor score subtotal/maximum score subtotal)				<u>44</u>
2. Flooding				
	0	1	0	3
Subscore (100 X factor score/3)				<u>0</u>
3. Ground water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	0	8	0	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
Subtotals			<u>38</u>	<u>114</u>
Subscore (100 X factor score subtotal/maximum score subtotal)				<u>33</u>
C. Highest pathway subscore.				
Enter the highest subscore value from A, B-1, B-2 or B-3 above.				
Pathways Subscore				<u>44</u>

**IV. WASTE MANAGEMENT PRACTICES**

- A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	<u>41</u>
Waste Characteristics	<u>50</u>
Pathways	<u>44</u>
Total <u>135</u> divided by 3 =	<u>45</u>
	Gross Total Score

- B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

$$E-9 \quad 45 \quad \times \quad 1.0 \quad = \quad 45$$

## HAZARDOUS ASSESSMENT RATING FORM

Page 1 of 2

NAME OF SITE Site No.6 - Area Adjacent to HangerLOCATION Southwest of aircraft hangerDATE OF OPERATION OR OCCURRENCE North Dakota Air National Guard, Hector Field, Fargo, NDOWNER/OPERATOR Hector International Airport, Fargo, NDCOMMENTS/DESCRIPTION Fuel OutletSITE RATED BY HMTC

## 1. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	0	10	0	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	3	6	18	18
G. Ground water use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	3	6	18	18
I. Population served by ground-water supply within 3 miles of site	0	6	0	18

Subtotals 74 180Receptors subscore (100 X factor score subtotal/maximum score subtotal) 41

## 11. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L2. Confidence level (C - confirmed, S - suspected) C3. Hazard rating (H - high, M - medium, L - low) MFactor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor

Factor Subscore A X Persistence Factor = Subscore B

80 x 1.0 = 80

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

**III. PATHWAYS**

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 30 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
				Subscore <u>0</u>
B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	23
Surface permeability	3	6	18	18
Rainfall intensity	1	8	8	24
			Subtotals	<u>48</u> <u>108</u>
			Subscore (100 X factor score subtotal/maximum score subtotal)	
			<u>44</u>	
2. Flooding				
	0	1	0	3
			Subscore (100 X factor score/3)	
			<u>0</u>	
3. Ground water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	0	8	0	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
			Subtotals	<u>38</u> <u>114</u>
			Subscore (100 X factor score subtotal/maximum score subtotal)	
			<u>33</u>	
C. Highest pathway subscore.				
Enter the highest subscore value from A, B-1, B-2 or B-3 above.				
			Pathways Subscore	<u>44</u>

**IV. WASTE MANAGEMENT PRACTICES**

- A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	<u>40</u>
Waste Characteristics	<u>80</u>
Pathways	<u>44</u>
Total <u>164</u> divided by 3 =	<u>55</u>
	Gross Total Score

- B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

$$\frac{55}{1.0} = 55$$

## HAZARDOUS ASSESSMENT RATING FORM

Page 1 of

NAME OF SITE Site No. 10 - Fire Training Area (FTA)LOCATION North Dakota Air National Guard, Hector Field, Fargo, NDDATE OF OPERATION OR OCCURRENCE 1959-1984OWNER/OPERATOR 119th Civil Engineer Squadron, North Dakota Air National GuardCOMMENTS/DESCRIPTION Site Designated for Fire Training ExercisesSITE RATED BY HMTC

## I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	2	4	4	12
B. Distance to nearest well	0	10	0	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	3	6	18	18
G. Ground water use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	3	6	18	18
I. Population served by ground-water supply within 3 miles of site	0	6	0	18
Subtotals			74	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal)

41

## II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large)

L

2. Confidence level (C - confirmed, S - suspected)

C

3. Hazard rating (H - high, M - medium, L - low)

M

Factor Subscore A (from 20 to 100 based on factor score matrix)

80

B. Apply persistence factor

Factor Subscore A X Persistence Factor = Subscore B

80 X 1.0 = 80

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

80 X 1.0 = 80

**III. PATHWAYS**

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 30 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
				Subscore <u>0</u>
B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	23
Surface permeability	3	6	18	18
Rainfall intensity	1	8	8	24
Subtotals			48	108
Subscore (100 X factor score subtotal/maximum score subtotal)				44
2. Flooding	0	1	0	3
Subscore (100 X factor score/3)				0
3. Ground water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	0	8	0	24
Subsurface flows	1	8	3	24
Direct access to ground water	0	8	0	24
Subtotals			38	114
Subscore (100 X factor score subtotal/maximum score subtotal)				33
C. Highest pathway subscore.				
Enter the highest subscore value from A, B-1, B-2 or B-3 above.				
Pathways Subscore				44

**IV. WASTE MANAGEMENT PRACTICES**

- A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	41
Waste Characteristics	80
Pathways	44
Total <u>165</u> divided by 3 =	55
Gross Total Score	

- B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

$$\underline{55} \times \underline{1.0} = \boxed{55}$$

